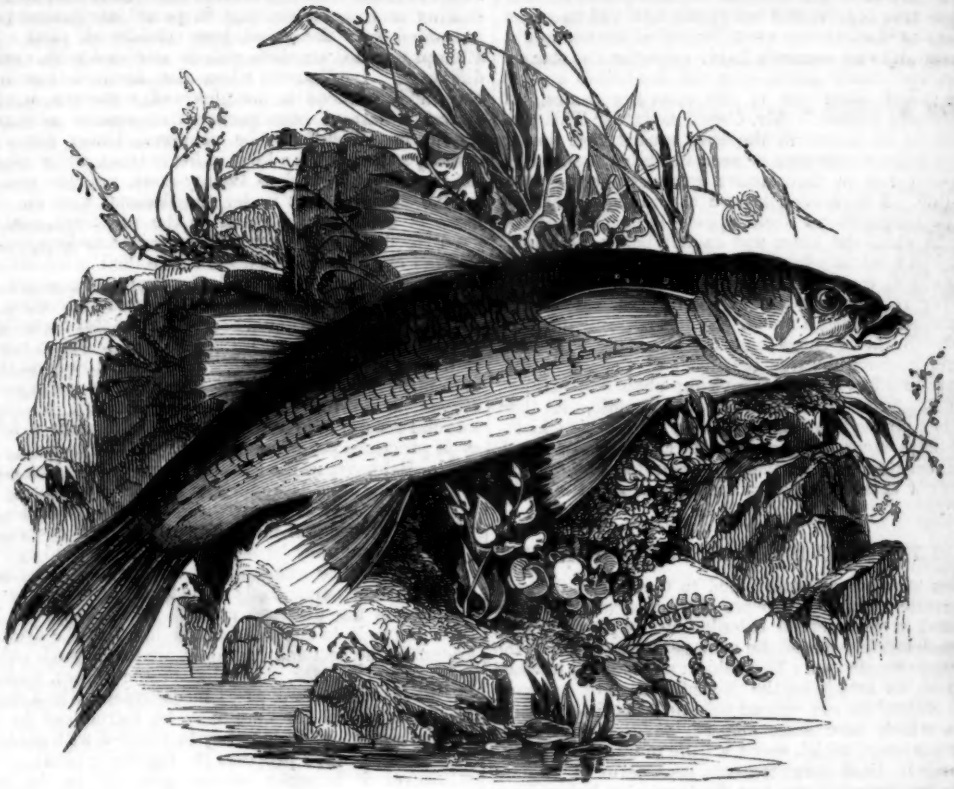

[The Grey Mullet.]

THE GREY MULLET.

One of the angler-poets, whom Walton loved to quote, says:—

> "I care not, I, to fish in seas;
> Fresh rivers best my mind do please,
> Whose sweet calm course I contemplate,
> And seek in life to imitate."

But the grey mullet only ascends and descends rivers with the flow and ebb of the sea. Away, therefore, must we go from "the brink of Trent or Avon," where the angler's pleasure is to see his

> "——— quill or cork down sink
> With eager bite of perch, or bleak, or dace."

The grey mullet haunts the shallow waters on the coast, never going far from land; and though it ventures up rivers, it invariably returns with the tide. There are six places in Sussex, according to a saying probably many centuries old, each of which is celebrated for a particular kind of fish; and Arundel, one of these places, is distinguished for its mullets. The town is ten miles from the sea; but Mr. Yarrell mentions, as a remarkable circumstance, that, in 1834, the grey mullet was taken ten miles higher up the Arun, at Bambergh Castle, which is twenty miles from the sea. Walton does not once mention having angled for the grey mullet, but had he done so, the sport would have called into exercise all his skill and all his patience; for so careful is it not to swallow any large or hard substance, that it has a trick of getting the bait into its mouth and of rejecting it if suspicion be at all excited. Even if hooked, it is often only in the lips, and it then plunges with much violence, and often effects its escape. The grey mullet spawns about Midsummer. The general colour of the adult is a darkish grey, with a tinge of blue, and the sides and belly, which are white, are marked by dark longitudinal lines. The form of the mouth is very peculiar, and is thus described by Mr. Yarrell:—"The lower jaw is divided in the middle by an ascending angular point, which, when the mouth is closed, passes within the upper jaw; the upper jaw also, if viewed from below, is likewise angular." Besides the grey mullet there are two other species, the thick-lipped grey mullet, which abounds in considerable numbers on the coast of Cornwall, and another, of which Mr. Yarrell caught a specimen at the mouth of Poole harbour, which is remarkable for the shortness of its form. Cuvier remarked that the species of European mullets had probably not been well ascertained. The mullet for which the Romans gave such extravagant prices for their entertainments, is altogether a different species.

By experiments which have been made for ascertaining whether salt-water fish could be kept in ponds of fresh-water, it has been found that the grey mullet has actually improved. Some fry were put into a pond of three acres in Guernsey, when about three inches in length, and in four years they weighed four pounds, and were "fatter, deeper, and heavier than those obtained from the sea."

Mr. Couch, a Cornish gentleman, who has paid great attention to the habits of fish on the shores of the county in which he resides, communicated some interesting facts respecting the grey mullet for Mr. Yarrell's valuable work on 'British Fishes.' "When

enclosed within a ground-sean or sweep-net, as soon as the danger is seen, and before the limits of its range are straitened, and when even the end of the net might be passed, it is its common habit to prefer the shorter course, and throw itself over the head-lines and so escape; and when one of the company passes, all immediately follow." Mr. Couch adds:—"This disposition is so innate in the grey mullet, that young ones of minute size may be seen tumbling themselves head over tail in their active exertions to pass the head-line. I have even known a mullet less than an inch in length throw itself repeatedly over the side of a cup in which the water was an inch below the brim." But when a solitary fish has been left in the net, and all means of escape are prevented, the same accurate observer relates that it will then make a desperate effort to pass through one of the meshes, retiring previously to the greatest possible distance, and then rushing at once towards that part of the net which appears to offer the most inviting chance of escape; when it finds itself held by the middle, it then quietly submits to its fate. Carew, the Cornish historian, kept some grey mullet in a salt-water pond, which became so tame, that they would assemble together at a certain noise which he was accustomed to make.

DECIMAL DIVISION OF THE COINAGE.

THOSE who are unaccustomed to the use of decimal arithmetic are scarcely aware of the vast waste of time entailed in commercial calculations by the want of a decimal subdivision of the coinage, in the place of the system now acted on. The subject was slightly touched upon in an article on the 'Simplification of Arithmetical Rules,' in our second volume; but in the nine years which have since elapsed, various plans have been proposed, which merit a little of our attention.

In all decimal arrangements, each term in a quantity is ten times as great as the term next below it, so that all the terms form a series increasing by a regular law. But in the common English coinage, or in monetary accounts, we use four terms or denominations differing materially in their rate of increase. Our largest denomination or unit is the pound sterling; then the next is a twentieth part of this, viz. the shilling; the third in the series is a twelfth of the shilling; and the penny, the twelfth thus obtained, is divided into four parts to obtain the lowest denomination, or farthing; hence we have three rates of increase, according as the multipliers or divisors are 20, 12, or 4. The complexity is shown most when we have to multiply a sum of money by any number. Suppose, for instance, that we purchase twenty-five articles, at *1l. 2s. 6d.* each; we have first to multiply the pence by 25, and find how many shillings and remaining pence there are; then to multiply the shillings by 25, adding thereto the shillings derived from the previous multiplication; and, lastly, to multiply the pounds by 25, increasing the product by the pounds derived from the antecedent multiplying. But if the sum of *1l. 2s. 6d.* were put in the decimal form £1·125, the problem would be one of plain multiplication, thus:

£1·125
25

without the puzzling operation of reducing from one denomination to another. If 10 farthings made a penny (or a coin called by any other name), 10 pence a shilling, and 10 shillings a pound, then the decimally-expressed quantity £1·125 would be one pound, one shilling, two pence, and five farthings.

But the great obstacle to any changes of this kind is the tenacity with which ancient customs are adhered to. That four farthings make a penny, twelve pence a shilling, and twenty shillings a pound, are truisms so imbedded into the mind from childhood, that any attempt to eradicate them will be attended with much difficulty. In France, when the decimal notation became introduced in weights and measures, it was almost a natural consequence that similar changes should be effected in the coinage. Under the old system, accounts were kept in *livres, sous,* and *deniers,* the livre being equal to twenty sous, and the sou to twelve deniers; but under the decimal system, the *franc* is made nearly equal to the old *livre,* and is subdivided decimally, so that ten *décimes* make a *franc,* and ten *centimes* make a décime. In the United States, too, accounts are simplified by expressing sums of money in "dollars" and "cents" or hundredths of dollars; thus a sum equal to a dollar and three-quarters (*7s. 7d.* English) is expressed 1·75. It is not so much in the actual passage of money from hand to hand that any inconvenience or delay arises under the present system, as in the computation or keeping of commercial accounts, in which a saving of figures written or of processes performed is so much time gained.

Mr. Babbage, in the second edition of his 'Economy of Manufactures,' introduced a chapter on "Money as a Medium of Exchange," and therein remarks:—"The subdivisions of money vary in different countries, and much time may be lost by an inconvenient system of division. The effect is felt in keeping extensive accounts, and particularly in calculating the interest on loans or the discount on bills of exchange." He then proceeds to express an opinion, that the decimal system is the best adapted to facilitate all such calculations, and that the abolishing of the *guinea,* without having produced any great inconvenience, is a proof that changes in the coin may be introduced to the desired extent, provided they be effected with caution. Mr. Babbage then proposes the following plan:—"If, whenever it becomes necessary to call in the half-crowns, a new coin of the value of two shillings were issued, which should be called by some name implying a unit (a prince, for instance), we should have the tenth part of a sovereign. A few years after, when the public were familiar with this coin, it might be divided into one hundred instead of ninety-six farthings; and it would then consist of twenty-five pence, each of which would be four per cent. less in value than the former penny. The shillings and sixpences being then withdrawn from circulation, their place might be supplied with silver coins, each with five of the new pence, and by others of ten-pence, and two-pence halfpenny; the latter coin, having a distinct name, would be the tenth part of a prince." By this plan, the decimal system might be retained at the same time as the binary, to which retail dealers are so much accustomed; there would be a denomination for the tenth part of a sovereign, one also for the hundredth part, and one for the thousandth; these might soon be brought into requisition in bankers' and merchants' accounts; while the other coins would be fitted for those retail dealers who require smaller submultiples than ten.

In the 'Companion to the British Almanac, for 1841, Professor de Morgan points out a simple and expeditious mode of converting sums of money into decimal fractions of a pound, or, in other words, expressing money decimally, instead of by the usual circumlocution of *£. s. d.* He then adverts to the possibility of so adjusting the coinage as to enable this decimal computation to be brought into use in the common affairs of life. The principle advocated is in many respects similar to that of Mr. Babbage; but the propriety of allowing time for one change to become established before another is introduced, is

insisted on more pointedly. Mr. de Morgan proposes the introduction of a new coin valued two shillings, to be called the "royal," which is to be issued from the Mint and brought gradually into circulation, the half-crowns being melted up as fast as they come to the Bank or the Mint. By this means the first step would be made towards a decimal division of the pound sterling; and matters might be allowed to rest there for a few years, till the public became accustomed to the alteration. Then would be issued a copper or a silver or a mixed metal coin valued at two-pence halfpenny of present money, and which might perhaps be called a "groat;" persons would become accustomed to this as they have to the half-crown, each being equal to $2\frac{1}{2}$ of some particular coin. This groat might, in the first instance, be deemed two-pence-halfpenny of present money, and ultimately as the tenth of two shillings, or $2\frac{1}{10}d.$; for, as Mr. de Morgan remarks, this alteration of four per cent. in the value of a copper coin is not important, since the daily fluctuations in the price of copper amount to much more. We should then have the tenth and the hundredth of a pound; but pence and halfpence might be left in circulation till persons were accustomed to the change. The thousandth of a pound would result from making a minute change in the size of the present farthing, since nine hundred and sixty farthings make a pound; so that we should then have ten farthings equal to a groat, ten groats equal to a royal, ten royals equal to a sovereign. It would be necessary to enact that five groats should be legal tender for one shilling, and ten groats for a royal; but Mr. de Morgan thinks this would produce no practical inconvenience. The advantages likely to accrue from such a change are thus enumerated:—All computations would be performed by the same rules as in the arithmetic of whole numbers; an extended multiplication table would be a better interest table than any which has yet been constructed; the application of logarithms would be materially facilitated, and would become uinversal, as also that of the sliding rule; the number of good commercial computers would soon be many times greater than at present; all decimal tables, as those of compound interest, &c., would be popular tables, instead of being mathematical mysteries; and when the decimal coinage came to be completely established, the introduction of a decimal system of weights and measures would be very much facilitated, and its advantages would be seen.

Still more recently, this subject has been brought under the notice of the British Association for the Advancement of Science. At the meeting of the Association in June last, the Rev. G. Peacocke, Dean of Ely, communicated the Report of the Commissioners for the restoration of lost standards of weights and measures, and their proposal for the introduction of a decimal system. The imperial standards of weight and measure having been lost in the fire which destroyed the two houses of Parliament, a commission was appointed to report on the best means of restoring these standards. That portion of the Report which relates to weights and measures we need not consider here, further than to state that a "primary unit" of each kind is recommended to be retained, whatever be the other approximations towards a decimal system; the primary units being the pound sterling, the imperial pound, the yard, the acre, and the gallon. With respect to the coinage, the Commissioners, taking the pound sterling as the primary unit, proposed to introduce a coin of the value of two shillings (one-tenth of the pound); another, either silver or copper, of one-tenth of two shillings (or 2*d.* and a fraction), which might be called a *cent*, as being the hundredth of a pound sterling; and a third, called the *millet*, to consist of one-thousandth of a pound, and therefore a little smaller than the present farthing. For the proposed coin of two shillings, various names had been suggested, as "Victorine," "rupee," or "florin;" it being not much different from the value of some of the rupees in the East Indies, or the florin of the Continent. Under this new decimal scale the shilling would be retained, and also the sixpence,—but the latter under another name better expressing its value under the new order of things.

It will be seen that the suggestions of Mr. Babbage, of Mr. de Morgan, and of the Commissioners, all point pretty much in one direction—all recommend a coin value two shillings of present money, whether called a "Prince," a "Royal," or a "Victorine;" all suggest another coin, one-tenth of this in value, and equivalent to rather less than two-pence halfpenny; and also the striking of "farthings" equivalent to one-thousandth of a pound. The opinion seems also to be pretty general that the binary divisions of the shilling and sixpence, &c., or of coins nearly equal to them in value, should be retained. The nature of these propositions is such, that until persons engaged in keeping financial accounts become fully alive to the facility and expeditious operation of decimal arithmetic, mischief rather than good would result from making a change; since the small shopkeepers will never deem the matter of so much importance as to justify the change. Old habits are unlearned with difficulty, even when the advantage of a change is pointed out; and hence the importance of making the advantage of such a change as this obvious to those who will first feel the benefit, viz., bankers and commercial men. If these classes are disposed to regard the change with approbation, half the difficulty would be removed.

The History of a Piece of Tape.—To trace the various processes a piece of tape passes through, and the various employments it affords, before it comes into the market, is a very curious and interesting occupation. Beginning then with the first commercial operations:—The cotton used in the manufacture of tapes having been warehoused, we will say for instance, in Liverpool, is sold on account of the importer, and bought to the order of the manufacturer by cotton-brokers. It is conveyed by canal or railway to Manchester, and when delivered at the works of the purchaser, is weighed, assorted, mixed, and spread, with a view to obtain equality in the staple. It is then taken to the willowing-machine to be opened and rendered flocculent; thence it is transferred to the blowing-machine, which cleanses it from dust and makes it feathery. Attached to the blower is a lapping-apparatus, by which the cotton is taken up and laid in a continuous fleece upon a roller, in order that it may be conveniently carried to the carding-engine, there to be made into a fleece of the most equable texture possible; thence it is handed to the drawing-frame, where it is blended with the production of all the carding-engines connected with the particular set or system to which it belongs. It is next passed through the slubbing-frame, afterwards through the jack or roving-frame, and then through the throstle or spinning-frame, upon which it is made into yarn or twist. From the throstle, the yarn, if intended for warp, is forwarded to the winding-frame; but if intended for weft, to the reeler. Afterwards, that which is wound is delivered to the warper; that which is reeled, to the pin-winder. The weaver next operates upon it, passes it through the loom, rubs up the tape, and consigns it to the taker-in, who examines the fabric and transfers it to the putter-out, who sends it to the bleacher. When bleached, it is handed to the scraper, whose business it is to take out the creases, and open the tape, by running it under and over iron scrapers. This having been done, the piece is put through the calender, when it is pressed between bowls, and rendered smooth and glossy. It is next taken to the lapping department, where it is neatly folded by young women; after which the maker-up forms the piece into parcels, containing the required quantity, and places them in a powerful press to make them compact. He next papers them, and sends them to the warehouse for sale.—*J. G. C.*

[New Abbey.—From an Original Sketch.]

NEW ABBEY, OR ABBEY OF SWEET-HEART.

THE picturesque ruins of the Abbey of Sweet-heart lie in the Stewartry of Kirkcudbright, upon the left bank of the Nith, about seven miles south of Dumfries. They consist of the church and part of the chapter-house, the only remains of the once magnificent and extensive building founded by Devorgille, one of the coheiresses of Alan, the last of the ancient lords of Galloway, wife of John Balliol, lord of Barnard Castle, and mother of John Balliol, king of Scotland, in the early part of the thirteenth century. Her husband died in 1269, when she caused his heart to be embalmed, and preserved in a highly ornamented box of ivory bound with enamelled silver, which was set within the wall of the church near the high altar, from which circumstance the abbey obtained its name of Dolce Cor, or Sweet-heart.

The foundation was of the Cistertian order, and was liberally endowed with ten churches, the barony of Lochpatrick, and divers lands and other possessions, amounting in the whole to a revenue of 682*l*. The first abbot was Henry, who died on his journey to Citeaux; his successor, Eric, was among the free barons who swore fealty to Edward I., on his undertaking the arbitration between the claims of Balliol and Bruce for the crown of Scotland. The number of the brethren is not exactly known, but in 1548 a charter appointing Robert, Master of Maxwell, and his heirs, to be hereditary baillies of the abbey, to take the said abbey under their protection, for which they were to receive lands, mill, and fishings, feued at 117 merks 8 shillings and 8 pennies Scots, has the signatures of the abbot and thirteen monks. The last abbot was Gilbert Brown, who sat in parliament when the Confession of Faith was adopted on August 17, 1560. He was an active controversialist on the Catholic side, and, as Dr. M'Crie says in his 'Life of Melville,' "a busy trafficker for Rome and Spain;" he had consequently the distinction of being specially named by the Commissioners of the Assembly when, in their list of grievances submitted to the king in 1596, they stated the "Jesuits and other excommunicated persons were entertained within the country;" orders were issued for his apprehension on this charge, but it was not till 1605 that he was taken, nor then without difficulty, as Calderwood states that the people attempted to rescue him. He was, however, treated with considerable indulgence, and after an imprisonment of some length in Blackness and Edinburgh castles, was allowed to leave the kingdom for France, where he died, at Paris, in 1612.

After the Reformation the abbey remained in the hands of the crown from 1587, when the Annexation Act passed, till 1624, at which time it was granted to Sir Robert Spotswood. From this family it passed by purchase to Mr. Copeland, during whose possession much of the building was destroyed by the tenantry for the sake of the stone, though contrary, it is said, to the stipulations contained in the leases granted by him. Greatly, however, to the credit of the neighbouring gentry, in order to preserve the venerable relics from total destruction, they raised a sum of money by subscription, with which, through the minister of the parish, they purchased its preservation, since which time the ruins, and even the outer wall, have been carefully respected.

The abbey stood in an enclosure, now called the Precinct, of upwards of twenty acres. It was surrounded by a wall, part of which yet remains, built of granite, the stones of which are of immense size, some, even near the top, weighing a ton each. The church was a beautiful lofty pile, in the light ornamented Gothic style, of a cruciform structure. Its length is two hundred and twelve feet; the breadth at the transepts is one hundred and fifteen feet, and of the nave and chancel sixty-six feet. The tower, which had a sort of gable roof or story, is ninety-two feet high. "In the roof of the south transept is an escutcheon, charged with two pastoral staves in saltire, over them a heart, and beneath them three mullets of five points, two and one, said to be the arms of the abbey."* Over the escutcheon is an inscription: Mr. Thomson, the architect, who measured this and other similar buildings in 1821, procured a ladder in order to examine this inscription more closely; he made a tracing of the projecting letters, which are in old English, and found the words to be "Choose time of need," spelt thus, "Chus Tim o' Nid." Grose, who was not able to read the motto himself, took it on report to be "Christus Maritus Meus."

Lord Kames, who often visited New Abbey, was the first who published an account of a very singular ash-tree which grew from some seed dropped on one of the abbey walls. Considering its situation, the sapling had grown to a considerable size, and in the course of time put forth a runner, which, after descending the wall, entered the ground, and supplied the parent-

* Grose, 'Antiquities of Scotland.'

tree with nourishment, like a root formed in the usual manner. Such a phenomenon is of rare occurrence; and though the original no longer exists with the feeder that rendered it so curious, its place has been supplied by roots, which may hereafter have similar action.

The parish in which New Abbey is situated was anciently named Kirkindar, but has since adopted the name of its great ornament, and is now called the parish of New Abbey. It extends along the Nith to the Solway Frith; the parish is extensive, and the lower part is fertile and well cultivated, while the upper and by far the larger portion consists chiefly of rocky hills, mosses, and muirs. The air is considered fine and healthy, and the place is much visited in summer for the benefits to be derived therefrom, and from the use of goat's whey and sea-bathing. The parish kirk, built in 1731, stands on the south side of the abbey church, and is formed out of part of the ruins; "near it is a small gate," says Grose, "leading into the abbey, on which is a bell: this is of a curious style of architecture; on it are several defaced carvings in basso-relievo, with two escutcheons of arms. The burial-ground lies to the east of the abbey church; in it are some ancient tombstones; on one a cross, with a large and broad sword on the sinister side of it." In the parish, which has a population of about twelve hundred, besides the parochial school, there are two other schools with small endowments. The valley or bottom in which New Abbey is situated declines gradually to the shore of the Solway, and is watered by the Glen burn, called also New Abbey Pow, a stream or inlet of the sea, which is navigable for coal and lime boats or other vessels of sixty or seventy tons burthen. When the weather is favourable, the view from the abbey is varied and extensive, embracing a large portion of the coast of England. Loch-Kindar, with its little island and ancient ruin, which is seen from the tower of the abbey, is still a fine lake for trout.

At some little distance from the abbey there yet remain some ruins of what was once the private residence of the abbots of Sweet-heart, when they withdrew for business or pleasure from their official duties in the abbey. It is called the Abbot's Tower; and as it stands on a height, was probably considered more healthy than the wooded bottom occupied by the abbey and village beneath.

ON THE PROPER MANAGEMENT OF FOREST-TREES.

[From a Correspondent.]

CONSIDERING the means that have been afforded, it is truly astonishing to see with what neglect ninety-nine wood and hedge-row trees out of a hundred have been and still are suffered to remain. No branch of rural affairs, without exception, has made less progress or is upon the whole less understood than the pruning of trees. The utility of pruning hard-wood trees is generally admitted by practical men. Although pruning in ordinary cases does not ultimately increase the bulk or weight of wood, yet trees which are early, judiciously, and annually pruned, will be improved in quality, increased in their useful dimensions and eventual value, and a greater number can be grown on a given space. Judicious and early pruning is essential towards promoting the growth and value of by far the larger variety of hard-wood trees, and even of the coniferæ in exposed situations. Their value as timber is much deteriorated by numerous ramifications attracting and retaining a great proportion of the elaborated sap, which, if properly directed by judicious pruning, would go to form valuable timber in the main trunk of the tree.

In some situations the necessity of pruning may be in a great measure obviated by thick planting and timely thinning. These means are generally most effectual in producing straight and well-grown timber in every species. In such cases thinning early prevents the necessity of excessive pruning. Some are of opinion that much may be done in thick oak-woods without pruning, by carefully thinning out the worst trees, and leaving those best calculated to become fine timber; but when woods are thin, pruning and training scientifically are essential. Thick planting and early thinning are the nearest possible to the unassisted operation of natural causes towards the formation of tall, straight, and well-grown timber.

In order to produce the most beneficial effects, the process of pruning should be begun early, and not carried to any large extent at once, but renewed every year as the tree advances, until it is brought to the most perfect form its nature will admit of. When trees in the plantation have produced three or four thriving two-years'-growths, pruning should be commenced. At this period the knife is the most suitable implement, and the top is the principal part which requires attention. In order that only one shoot may be allowed to remain as a leader, the others next in size, if not very inferior, must be removed or headed down, that is, foreshortened, generally to about one-half the length, and all the stout branches on the tree removed close to the stem or headed in the same manner. If the tree be stunted, the best shoot should be selected as a leader, and by this means its health will be restored. All scientific planters agree in reprobating the common error of clearing young trees entirely of side-branches up to a certain height. It is a very general practice in the management of plantations to clear the stem of all side-branches to a certain height at the first pruning, and afterwards to operate only on the under branches of the tree. This tends to produce a small trunk, an irregular top, and side-branches more vigorous and over-luxuriant than the leader. When this is practised in exposed places, not one in a hundred ever becomes a large or valuable tree.

It is also one great and common error to cut off in one year branches to the height perhaps of fourteen feet from a tree not above twenty feet high. When this is done, the trees remain stationary, and are often stunted to such a degree as to assume the appearance of old age. Such an excess of amputation destroys the health of the tree by depriving it of the organs by which a sufficiency of sap is secured to be afterwards converted into wood.

All foresters insist especially on the necessity of encouraging the leading shoot, and checking all others which have a tendency to compete with it, so as to divide the stem into forks or clefts. It is well known that when the leading shoot is destroyed the growth of the tree is seriously impaired. By increasing the number of leading shoots the strength of the nutritious principle is rendered in a great measure ineffectual. Pruning is only of much advantage when it is performed early in those side-branches which are apt to bear too great a proportion to the leading branch, thereby modifying the tree and directing its energies gradually to the top, preserving at the same time a sufficient quantity of foliage. Where the hedge-row trees and trees in open situations are intended for profitable timber, pruning should commence at an early period of their own growth, encouraging the leading or main stem by displacing or shortening all over-luxuriant or aspiring side-shoots, by ripping off buds likely to contend with the leader, gradually clearing the lower part of the stem or side-shoots, and forcing the top into the shape of a very open cone. Trees thus managed will form close and healthy stems with-

out any interior blemish, and be trained to any reasonable altitude according to the soil, subsoil, and situation on which they grow; but if neglected, such is the propensity of most sorts of what are called "round-headed trees" in open spaces to run into branches, that without due attention the foliage will become too voluminous for the roots, and a check to loftiness and the formation of useful timber will ensue. The only rule to attend to is to keep the top to taper, preserving the leading shoot clear and free from clefts and the bole free from all the largest-rooted branches, leaving those only of the smaller kind that are requisite for the health and support of the tree, and clearing the tree from the bottom of all the branches as it advances in age. But the bole should be cleared very slowly at first when the trees are young. Only keep the branches that are left thereon small by often pruning, so as not to injure the tree when it becomes timber. By the heads of trees being kept tapering when young, the rapidity of the growth is greatly increased on account of the sap being confined to the most useful points, and not allowed to spread in support of large unnecessary branches. By attending to these rules and the operation of pruning being executed every year, the bole will be extended to a great height, and at the end the grand object attained, viz., the production of sound unblemished timber.

The proportions which will be found most consistent with full-sized trees are fifty feet of trunk to thirty-five feet of head. It is of the utmost importance that trees should have circumference of stem in suitable proportion to their height. In young trees there should be one inch of circumference for every fifteen inches of height. If the circumference is proportionably greater, so much the better. Trees should be examined every year till they are fifteen inches in circumference; the highest will then be fully eighteen feet.

Whenever dead branches are found on any tree, they cannot be too soon removed; and even fir plantations, which when thickly planted are generally self-pruned, will be improved by having all the dead wood pruned off quite close. Dead branches being allowed to remain on the bole only tend to produce moss, especially in damp situations; and their hurtful nature to trees of all kinds is too well known to require any further comment.

The greatest diversity of opinion seems to prevail respecting the proper season for pruning trees; indeed all different seasons have been mentioned as the most proper by one writer or another. As we have the testimony of authors that all of them have been put to the test of experience and have been attended with success, we may be tempted to conclude that provided we use proper caution in pruning and do not cut very large branches, it is not of very material consequence what season we choose for the operation, and that the smaller wounds caused by the gradual and careful pruning above recommended will heal in a reasonable time and without any great damage at any season of the year. There is no doubt still much to learn respecting the proper management of plantations and hedge-row timber.

ON RIVERS, GEOGRAPHICALLY CONSIDERED.

[Concluded from page 368.]

In a few rivers the tide ascends to a great distance from the sea. In the Amazonas it is perceptible in the Narrow of Pauxis near Obydos, a distance of nearly five hundred miles from the mouth of the river, measured along its course. If we suppose that the tide in this river advances at the rate at which it runs in the Elbe between the North Sea and Hamburg, namely, nearly a mile in five minutes, the tide can only reach the Narrow of Pauxis in forty-two hours, or in a space of time during which the direction of the tides has changed seven times at its mouth. It is therefore evident that the current of the Amazonas between the sea and the Narrow of Pauxis must, at the same time, in three or four different parts of its course, follow the impulse given to it by the tide, and run against the stream. We are of opinion however that the tide in the Amazonas advances more slowly than in the Elbe, owing to the stronger current of the Amazonas, and that the number of high tides in the Amazonas, between the two above-mentioned points, will probably be found to be five or six. The tide rushes into some rivers with great impetuosity, and produces what is called a *bore*.

Human ingenuity, even in the lowest state of civilization, has perceived the use of rivers as means of conveyance. Perhaps all rivers which have water enough to carry the smallest boats of any shape or form are navigated, except where the nature of the current opposes insuperable obstacles. These obstacles consist of *cataracts* or of *rapids*. When the river descends from a rock which rises several feet perpendicularly, it rushes down in a broken sheet of water, and is said to form a cataract. When the water descends with great velocity over an inclined plane of rock, it is said to form a rapid. A cataract may be descended when it is only a few feet high. Rapids may be ascended and descended in most cases with great labour and some danger, when they are not very long, and the bed of the river is free from projecting rocks, which however is rarely the case. The ascent of rapids is effected either by poling or by dragging the boats over the dangerous place by means of long ropes. Sometimes ropes are also used in the descent, as in the Rhine at Laufenburg in Switzerland. But generally either the whole cargo or a part of it must be taken out of the boat, and carried a certain distance by land. Such a tract, over which goods must be carried, is called a *portage*. At long and dangerous rapids the boats themselves must be carried or dragged over the portages.

River boats differ greatly in shape and construction, being always adapted to the nature of each river. Most rivers contain numerous shoals, on which the water is very shallow, and accordingly flat-bottomed boats are used, like the coal-barges in London. Keel-boats can only be used where the river has a depth of a few feet, and is free from shoals and sand-banks. When a river is shallow and rapid, but of considerable width, rafts are substituted for boats. Rafts generally consist of trees fastened together with ropes or the flexible branches of trees, or, in warm countries, by creeping plants; goods are placed upon the raft. When these rafts with their cargoes have arrived at their place of destination, the raft itself is sold, either as timber or as fire-wood, according to its dimensions and quality; and the crews return by land. When a river is too full of cataracts and rapids to allow either boats or rafts to descend, it may still be used for floating down timber or fire-wood. The trunks of trees, after being deprived of their branches, are thrown singly into the current, and towards the mouth chains are laid across the river, above which the trunks collect, and whence they are carried to their destination. This is frequently done in the rivers of the southern districts of Norway.

Rivers which traverse a mountain-region in some parts of their course, are either not navigable in this part or only in some places. Thus the Amazonas and Ganges, where they respectively flow within the ranges of the Andes and Himalaya Mountains, are not navigable, but the Rhine and the Danube are navi-

gable even within the mountains, in some parts for a considerable distance. The most extensive system of internal navigation is presented by those rivers which have a long course, and whose sources are situated at a comparatively small elevation above the sea. The Volga is navigable in the whole length of its course, and the Mississippi up to the Falls of St. Anthony, a distance of about eighteen hundred miles, measured along the river. Both these rivers, as already observed, have the greater part of their course between hills of small elevation, and they do not traverse a mountain-region.

The rivers of England supply the means of an extensive system of inland navigation, a circumstance partly due to their small fall, their sources being only a few hundred feet higher than their mouth, and partly to the abundant supply of water from rain, mists, and springs. Accordingly, if two rivulets unite, they generally form a small navigable river; and such as are not navigable become useful as feeders to canals. The navigation of most of the rivers of England has been much improved by artificial means.

The Thames is navigable for large sea-vessels to London Bridge, a distance of forty-five miles from the Nore, though the whole course of the river, measured along its windings, hardly exceeds two hundred miles. No river in the world, perhaps the Amazonas excepted, is navigable for vessels of such dimensions for one-fourth of its course. This circumstance is not due solely to the height of the tides, which is about nineteen feet at London Bridge, but mainly to the fact that there are no sand-banks at its mouth which prevent the access of large vessels. The river probably brings down sufficient earthy matter to form a bar, but owing to the direction of the tide, which is kept off from the mouth of the river by the projecting coast of Kent between the two Forelands, and there being consequently nothing to oppose the current of the river at its mouth, the earthy matter is carried farther from the coast, and deposited in deep water.

The advantages hitherto enumerated are common to rivers in all parts of the globe, but there are some countries in which the value of rivers is much increased by the use which is made of the water for irrigation. This occurs in those countries in which it either does not rain at all, or in which rain occurs only at a certain period of the year, and even then only for two or three months. The first class of such countries, for instance the western coast of South America between 5° and 28° S. lat., would be uninhabitable but for the rivers which descend from the western declivity of the Andes, and in their course to the sea have furrowed the surface with deep depressions or valleys, in which agriculture is carried on with success as far as the water of the river can be dispersed over the level part of the valleys by small canals. In those warm climates where the rains occur periodically, though only in two or three months of the year, the fields would certainly produce a crop, even without irrigation; but for more than half the year the soil would produce nothing for want of water. By using the water of the rivers for irrigating their lands, the inhabitants of those countries are enabled to get two and in many cases three crops annually. Even in the southern countries of Europe, where rain is very scarce in summer, and not sufficient to maintain vegetation, whilst the heat is excessive, irrigation is practised, and two crops of Indian corn are thus annually obtained, or one crop of wheat and a green crop.

In those countries in which the temperature for three or four months is under the freezing-point, the rivers during that time are covered with ice, and in this state they afford to the inhabitants, in some degree, the advantages which other countries derive from railways. Travelling and the transport of goods on the smooth ice of the rivers are much less expensive, and are performed in a shorter time than in summer in the ordinary way. This is the case on some of the rivers of New Brunswick and Lower Canada.

It has been observed that the outer borders of river-basins are the most elevated parts which occur in some given places between their respective beds, though it is not always the case that the watershed is formed by mountain-ridges. Owing to such a disposition of the surface, the waters which are collected on or near the borders run to one or other of the two rivers. Up to the commencement of this century it was thought improbable, if not impossible, that two different river systems or basins could be united by a natural water communication. But it is now ascertained that a low tract of country or a deep depression of the surface may occur, by which a portion of the water of a river, after being diverted from its own channel, may join a river which otherwise is not connected with that river from which the water branches off. The instances in which this occurs are very few, and we shall therefore enumerate those whose existence is beyond all doubt. The river Arno in Tuscany, in that part where it runs between the high ridges of the Apennines and approaches the town of Arezzo, sends an arm southwards through a narrow valley, under the name of Chiana, which falls into the Chiare, an affluent of the Tiber. The Chiana had been filled up with sand, but its course has been re-established by artificial means. Another case occurs in the kingdom of Hanover, a few miles east of the town of Osnabrück, where the river Haase divides into two branches, of which one, running west to Osnabrück, preserves its name, and after a course of many miles joins the Ems; the other, running east under the name of Elz, falls after a short course into the Werre, an affluent of the Weser. In Sweden two large rivers fall into the northern extremity of the Gulf of Bothnia, the Tornea Elf and the Calix Elf. About one hundred miles from the sea the last-mentioned river sends off an arm to the south-east, which after a course of about twelve or fifteen miles falls into the Tornea Elf: this arm is called Tarenda Elf. In these cases the rivers thus united by a natural water-communication flow in the same direction or nearly so. But in South America two large rivers, the Orinoco and the Amazonas, are united in this way in a part of their extensive courses, where the Orinoco runs west and the Amazonas east. The branch of the Orinoco by which this natural water-communication is effected is called Cassiquiare.

It is a kind of established rule that the whole course of a river should bear the same name, and that this name should be continued to that branch whose sources are farthest from the mouth. But practice is frequently at variance with this rule, and it may easily be accounted for. The inhabitants of a country preserve the name of that river which does not undergo any deflection of its course. At the confluence of the Mississippi and the Missouri, the latter is the larger river, and has had a course of above one thousand miles more than the former, but it does not deflect the course of the Mississippi by its junction, and the name of the last-mentioned river is preserved. The same occurs in South America as to the Amazonas and Madeira, where we find that the last-mentioned river changes the direction of its course to meet the Amazonas, whose name is preserved. In Europe the Rhine is joined by the Aar in Switzerland, above Laufenburg. The Aar is the larger river and brings down a greater volume of water, but the Rhine, where it is joined by it, continues its westerly course, and its name is preserved.

The extent of a few river basins is here given in

round numbers, but they must only be considered as rough approximations:—

Rivers.	Square Miles.
Thames	5,500
Rhine	89,000
Euphrates, including the Tigris	243,000
Brahmapootra	270,000
Danube	312,500
Indus	410,000
Ganges	443,000
Volga	653,000
Nile	707,500
Yan-tse-kiang	742,000
Mississippi	1,100,000
Plata	1,560,000
Amazonas	1,920,000

Law.—Of Law there can be no less acknowledged than that her seat is the bosom of God, her voice the harmony of the world. All things in heaven and earth do her homage; the very least, as feeling her care, and the greatest, as not exempt from her power: both angels and men, and creatures of what condition soever, though each in different sort and manner, yet all with uniform consent admiring her as the mother of peace and joy.—*Hooker.*

Obligations of Governments to encourage Commerce.—All men ought to find on earth the things they stand in need of. In the primitive state of communion, they took them wherever they happened to meet with them, if another had not before appropriated them to his own use. The introduction of dominion and property could not deprive men of so essential a right, and consequently it cannot take place without leaving them, in general, some means of procuring what is useful or necessary to them. That means is commerce; by it every man may still supply his wants. Things being now become property, there are no means of obtaining them without the owner's consent; nor are they usually to be had for nothing; but they may be bought or exchanged for other things of equal value. Men are, therefore, under an obligation to carry on that commerce with each other, if they wish not to deviate from the views of nature; and this obligation extends also to nations and states. It is seldom that nature is seen in one place to produce everything necessary for the use of man; one country abounds in corn, another in pastures and cattle, a third in timber and metals, &c. If all these countries trade together, as is agreeable to human nature, none of them will be without such things as are useful and necessary; and the views of Nature, our common mother, will be fulfilled. Further, one country is fitter for some kind of products than another, as, for instance, fitter for the vine than for tillage. If trade and barter take place, every nation, on the certainty of procuring what it wants, will employ its land and industry in the most advantageous manner; and mankind in general prove gainers by it. Such are the foundations of the general obligation incumbent on nations reciprocally to cultivate commerce. —*Vattel*, book ii., chap. 2, sect. 21.

Desire of Distinction.—Excellence in *all* things is no longer attainable, when the standard of excellence has universally been raised so high. A youth soon discovers this: he is beaten in his classics at school; he is left behind in his science at college; he is eclipsed in accomplishment in the drawing-room; he is awed into silence by the pedantry of the dinner table: his vanity is piqued; he does not allow himself to reflect, till he finds out the true solution of the problem, in his own idleness or desultory reading, or perhaps in the thoughtless ambition that would grasp at *all* knowledge when unable to retain a fraction; he therefore settles down into the determination, "I *will* be distinguished in something," and standing six feet in his shoes, and blessed with a muscular arm, he forthwith speculates on rivalry with Tom Cribb, or passing a-head of Maynard or Campbell in a sculling-match to Putney. His mistake is this: the world admires the rare combination of bodily grace with a well-endowed mind and power of understanding. It is felt, and justly, that human perfection is attained when the person and the intellect are equally and splendidly ornate; but this admiration is not capable of division: detach the personal merit from the intellectual excellence, and the wonder is gone. A profound mathematician, or an elegant classic, or an accurate historian, will be honoured as such; and an expert rower, or a skilful boxer, will receive such meed as may be due to his performance; but neither in the one case nor the other will it be the applause elicited by an "admirable Crichton." Even real versatility of talent does not necessarily imply transcendent genius—but the affectation of it provokes a smile. Where muscular power is substituted for learning as the object of ambition, it is tantamount to a confession that the vanity of the aspirant is limited to the distinction of Wapping-stairs or the Castle Tavern. To dance well, to ride well, to carry the head erect, and the limbs gracefully, are all accomplishments in some measure essential to every one whom birth and education raise above the labouring class; but unless a man is intended for a dancing-master, or a drill-serjeant, he may rest perfectly satisfied with as much in this way as he acquires in *statu pupillari*; and if he has not acquired such graces before he leaves school, he may be assured that all the training and teaching in the world will not, at riper years, transform him either into a Hercules or an Apollo: but though guiltless of this desiderated end, they may lead to another which he little anticipates: they entangle him in familiarity with the lowest of the low; they identify him with the circles of profligate blackguardism; they mark him as the associate of ruffians and thieves; and it need scarcely be added, that they thus alienate the confidence and abridge the esteem of all that are good and respectable in society. Every rowing-match or boxing-match, more especially the latter, is the resort of all the scum and scamps of the metropolis; a race-course or a suburban fair is scarcely a shade better; drunkenness, debauchery, and licentiousness are common alike to all, and exhibited too in their grossest and most revolting forms. Some coarse and foolish people are found to uphold them under the sophistical pretence, that the amusements of the poor should be respected; and if their amusements are legitimate and rational, most undoubtedly they ought not only to be respected, but liberally promoted. But we have seen the very men who thus court popularity, by pandering to the worst passions of the poor, in the sporting papers of the day, shrink with disgust from the contamination of the brutal scenes which they attend to report, and empty their pockets most cautiously of watch and purse before they elbow their way among the ruffians whose prowess they celebrate! The young man may be assured that he cannot habitually attend these degrading arenas without pollution and eventual infamy, or even avow an accustomed interest in them without endangering his welcome in every well-ordered family. 'Life in London' is not yet, we are happy to say, recognised as the life of London's educated circles.—*Guide to Service.*—*The Clerk.*

Turkish Houses.—The Turkish houses in Constantinople, as it is well known, are commonly of wood. The best of them, of ample dimensions, gaily painted, are pleasing to the eye; and all of them, however poor, are, from their form, invariably picturesque. Even the most splendid of the palaces of the sultan is of the same destructible material. The preference is given to wood by the Turks, not chiefly on account of economy, but from the persuasion that it is more wholesome than stone, and also, it is said, from a feeling of humility; it being considered by them presumptuous to dwell in buildings like their mosques, made, as it were, for eternity, and keeping no measure with the frailty of the occupants. The idea of the unwholesomeness of stone buildings is not perhaps without foundation in such a climate. The stone houses in Galata, built by the Genoese, with walls of extraordinary thickness, are of bad repute. Unless the rooms are kept warm in winter, they must be damp in the spring and early summer: so long as the walls are cold on the occurrence of a southerly wind, they will act as refrigeratories, and occasion a precipitation of moisture from the humid warm air. The thin walls of wood, on the contrary, conform more to the temperature of the atmosphere. None of the sitting-rooms of the houses have fixed fire-places or chimneys; they are heated in winter chiefly by a charcoal-fire, contained in the open mangal or covered tandour. The mode of warming their rooms is also suitable to the manner in which they are constructed. The crevices in the wooden work allow of a certain admixture of common air and escape of carbonic acid gas, sufficient to prevent any dangerous accumulation of the gas, so that the rooms are easily warmed, and kept warm and dry, without risk of life. Were the doors and windows of Turkish rooms suddenly made air-tight, and the fissures in the wood-work closed, there being no chimney to give vent to the fixed air, half the population of Constantinople might be suffocated any winter night between sunset and sunrise.—*Dr. Davy's Malta and the Ionian Islands.*